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BALLISTIC
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AIR RESEARCH
AND
DEVELOPMENT
COMMAND

10 NOVEMBER 1959
WDPCR-109



space probes program status report

UNITED STATES AIR FORCE, AIR FORCE POST OFFICE, LOS ANGELES 48, CALIFORNIA

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AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
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UNITED STATES AIR FORCE
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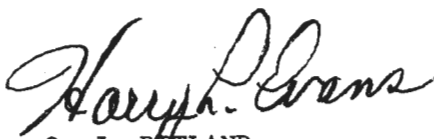
WDPCR

30 November 1959

SPACE PROBES PROGRAM
STATUS REPORT

FOREWORD

This report, covering progress during the period of 11 October 1959 to 10 November 1959, is the fifteenth in a series being submitted on Space Probe Programs assigned to the Air Force Ballistic Missile Division, Headquarters, Air Research and Development Command.

for 
O. J. RITTLAND
Maj. Gen., USAF
Commander

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I. BRIEF OF PROGRESS

A. Preparations for the 26 November launching of ABLE-4 ATLAS are proceeding as scheduled, with no problems apparent at this time. Many of the electrical tests and subsystems checks have been completed. Minor modifications have been made to the solar paddle tie-down and release mechanism, after an extensive testing program.

B. Work toward the 10 December launching of ABLE-4 THOR is also progressing on schedule. Subsystem checks have been started, and mechanical fit checks have been completed.

C. During the month of October, a total of 136 tests were performed on components and assemblies related to the ABLE program. These included acceptance tests, type tests, R&D tests, etc. Of this total, only three failures occurred, all of which have been corrected.

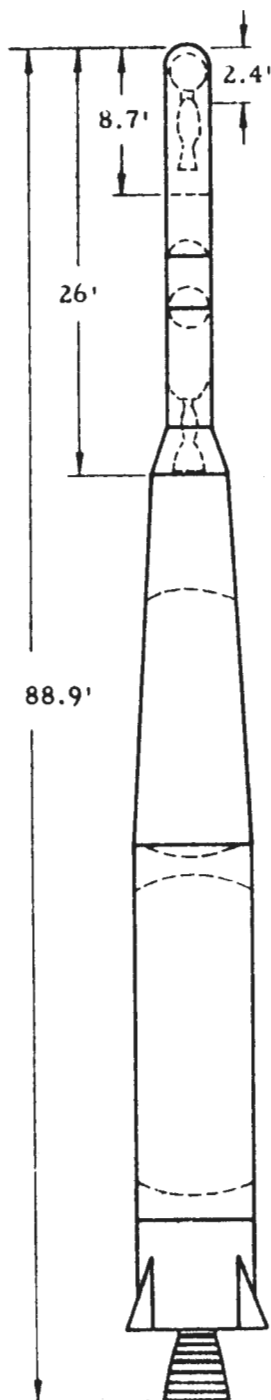
D. The Space Physics Data Library, Los Angeles, California, is now in operation. Data reduction gear in the Library is in bread-board operation with completion of the installation expected by mid-November. Analysis of ABLE-3 data is progressing satisfactorily at the Library.

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SPACE PROBES GLOSSARY

ABLE-3 VEHICLE



FOURTH STAGE

ARC IKS 420 injection Rocket

Thrust at Altitude 434 lb
Vacuum I_{sp} 248 lb-sec/lb

Total Impulse 498 lb-sec
Burnout Acceleration 3.3 g

THIRD STAGE

ABL-248 A3 Engine

Thrust at Altitude 3150 lb
Vacuum I_{sp} 250.5 lb-sec/lb

Total Impulse 116,400 lb-sec
Burnout Acceleration 16.5 g

SECOND STAGE

AGC 10-101A Engine:

Thrust (at altitude) 7670 lb
Thrust (mass burnout) 6910 lb
Vacuum I_{sp} (nom.) 271 lb-sec/lb

Total Impulse (nom.) 8.69×10^5 lb-sec
Burnout Acceleration 4.32 g

FIRST STAGE - THOR

Rocketdyne MB-1 Engine

Sea Level Thrust 153,248 lb
Sea Level I_{sp} (nom.) 248.7 lb-sec/lb

Vacuum I_{sp} (nom.) 289.7 lb-sec/lb

Total Impulse (nom.) 2.67×10^7 lb-sec
Burnout Acceleration 12.5 g

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II. ABLE-4 ATLAS

A. GENERAL

Launch of the ABLE-4 ATLAS is scheduled for 26 November at 0200 hours EST from the Atlantic Missile Range (AMR). If the launch is not made on that day, the time of launch advanced approximately one hour for each additional day. The trajectory will be completed by 2 November.

B. TECHNICAL STATUS

1. The following modifications have been made to the Stage I and Stage II transition structure: (a) increased blast door area, (b) relocation of liquid oxygen boil-off duct, and (c) revision of blast band so that it will clear the liquid oxygen boil-off duct. The unit was received at AMR and installed during the week of 26 October.

2. Checkout of second stage subsystems was partially completed during the latter part of October, with only the propulsion leak check (2 November) and covers-on-test (3 November) remaining to be made. No problems were encountered and none anticipated.

3. Dynamic balance of Stage II was performed at AMR on 19-20 October.

4. Stage III electrical cabling changes were completed on 23 October and the stage was fit checked successfully with the payload.

5. Test Van #3 was checked out and is now ready for use at AMR launch pad #14. Conversion of the electrical cabling also was completed and checked out. On 21 October, the umbilical cable was installed. After the terminal room equipment had been installed, an electrical check was made on 23 October.

6. Extensive testing of paddle tie-down and release mechanisms resulted in the following minor modifications: (a) use of 4 cutters instead of 2, (b) cutters installed at 4 locations instead of 1, and (c) use of a small spring to push the cord away from the fishpole. Evaluations were made of the paddle tie-down cords (Nylon) including low, medium and high temperature tests, with and without humidity. These are to be followed by cord tension tests.

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7. Payload separation tests were conducted successfully during the week of 12 October. The modified Marmon clamp assembly operated satisfactorily.

8. Modifications were made to the under-voltage control to permit this unit to be deactivated unless the 5-watt or 150-watt transmitter is on.

9. Payload #5 was shipped to AMR on schedule on 15 October. Payload #6 was shipped on 23 October.

10. On 22 October, checks were performed at AMR on cabling lengths for stage II guidance antennas.

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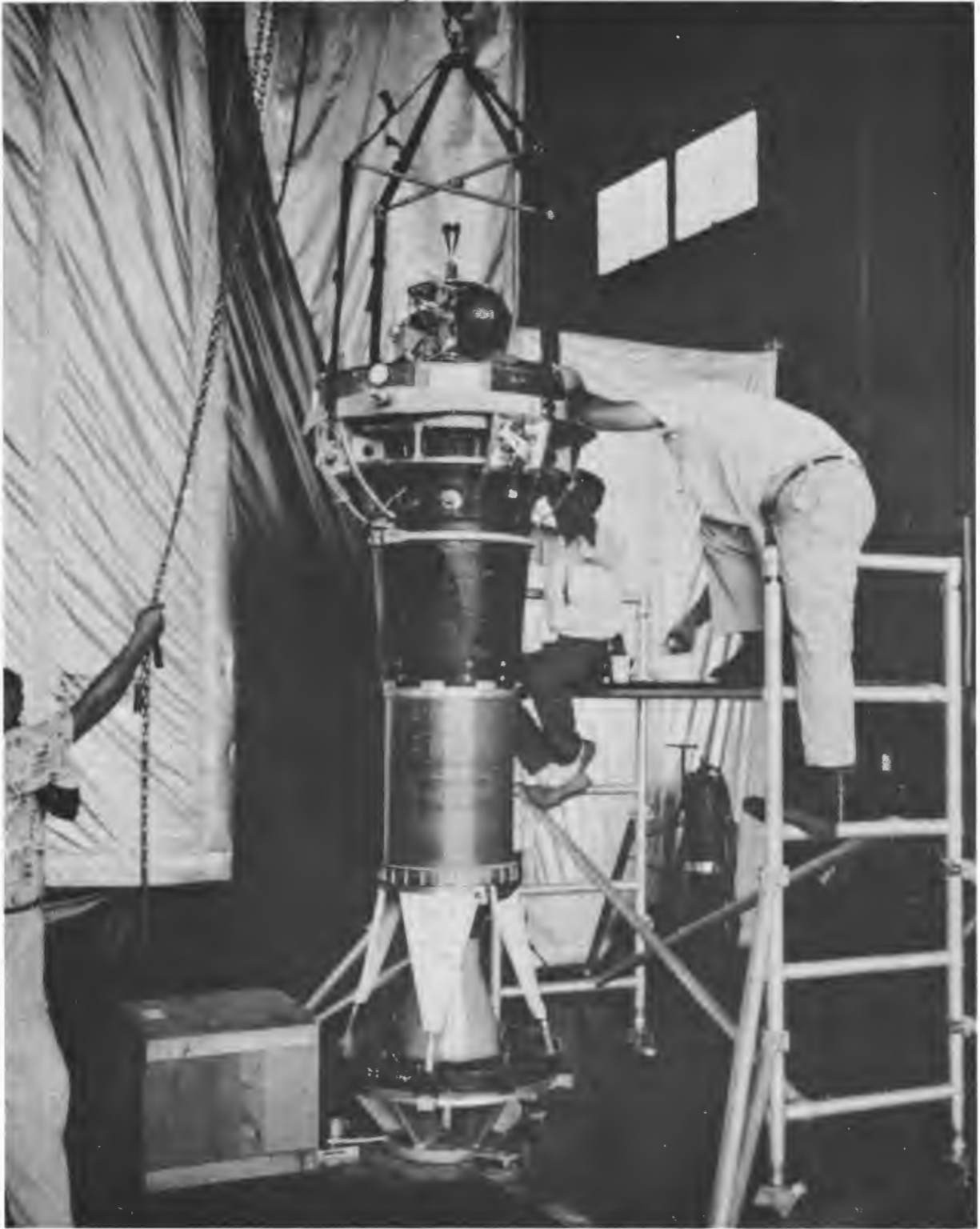


Figure 1. ABL-4 ATLAS payload during fit check with third stage.

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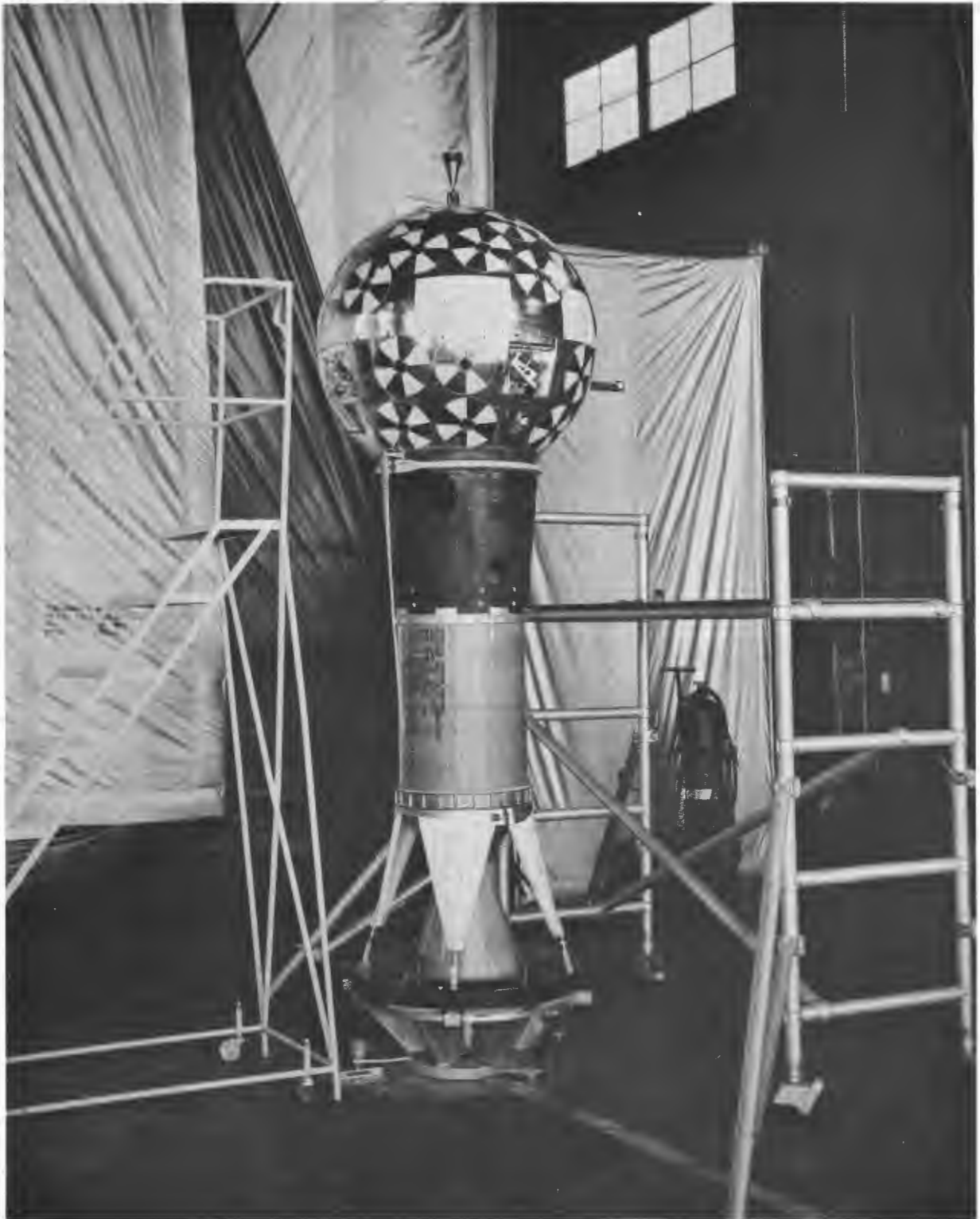


Figure 2. ABL-4 ATLAS payload mated to third stage. Solar paddles not installed.

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III. ABLE-4 THOR

A. GENERAL

Launch of ABLE-4 THOR is scheduled for 10 December. Time of launch has not been established. The final trajectory will be completed by 6 November.

B. TECHNICAL STATUS

1. Stage II weight and center of gravity test was completed on 19 October. The total weight was 562.0 pounds, corrected for paint and 20 psig of nitrogen in the tanks.

2. Stage II thrust chamber alignment test was performed satisfactorily on 18 October.

3. ABLE-4 THOR subsystem checks were started during the week of 26 October.

4. Over 75 percent of the stage II electrical cabling has been installed. Preliminary electrical tests were started on 23 October. Autopilot checkout was started on 30 October. Mechanical fit checks of the subsystems were completed by 24 October.

5. Test van #1 equipment has been installed and this unit is ready for checkout.

6. Extensive testing of paddle tie-down and release mechanisms resulted in the following minor modifications: (a) use of 4 cutters instead of 2, (b) cutters installed at 4 locations instead of 1, and (c) use of a small spring to push the cord away from the fishpole. Evaluations were made of the paddle tie-down cords (Nylon) including low, medium, and high temperature tests, with and without humidity. These are to be followed by a cord tension test.

7. Modifications were made to the under-voltage control to permit this unit to be deactivated unless the 5-watt or 150-watt transmitter is on. The failure of the 150-watt transmitter at simulated altitude necessitated sealing the unit, that is pressurizing it at about 1 atmosphere. Outgassing from some components in the payload during free flight was expected to prevent obtaining a low enough pressure to eliminate arc-over. The sealing is expected to increase the payload weight by one-half to three-fourths of a pound. The total weight of the payload is approximately 88 pounds at this time.

8. An additional set of payload antenna patterns were made using a polyfoam block in lieu of a tower so as to reduce reflections from the tower head.

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IV. GROUND SUPPORT PROGRAM

A. Manchester

1. The University of Manchester granted permission for the Rantec antenna assembly to be mounted on the roof of the Telescope Control Building. Use of this antenna location will permit improved low elevation angle visibility towards the west. Plans are now being made to effect this change.

2. Following modifications to the 10KW transmitter, accomplished in October, satisfactory operation has been obtained several times for extended periods. At the present time tests are being made to determine the cause of noise generated during transmitter operation which is affecting receiver operation.

3. Late in October, a linearly polarized feed for the 250-foot reflector was shipped to Manchester.

B. Hawaii

Effective 12 October, the full time maintenance of the three diesel generators was assumed by the Pacific Missile Range (PMR).

C. Equipment

1. Shipment of STL modified Motorola UHF receivers to Manchester and Hawaii, originally scheduled for 13 and 17 October, respectively, has been delayed until 2 and 4 November.

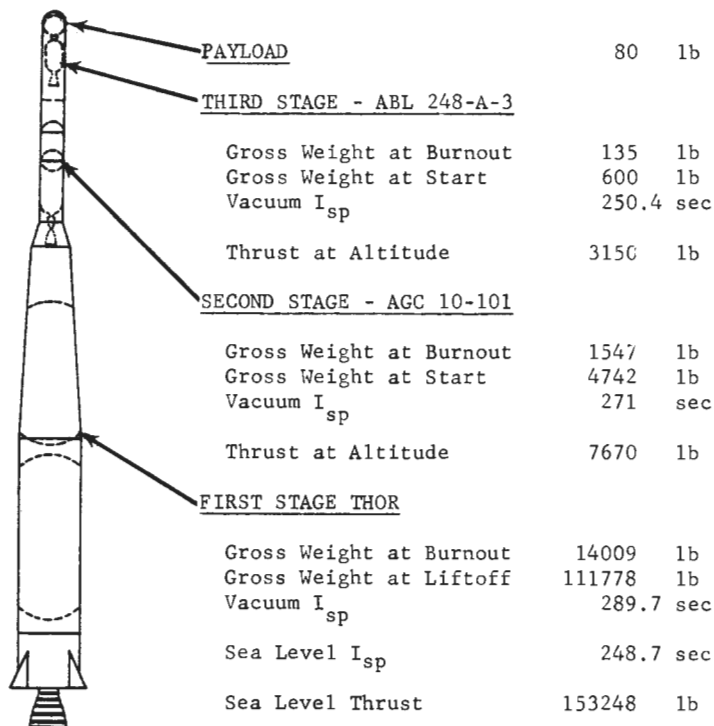
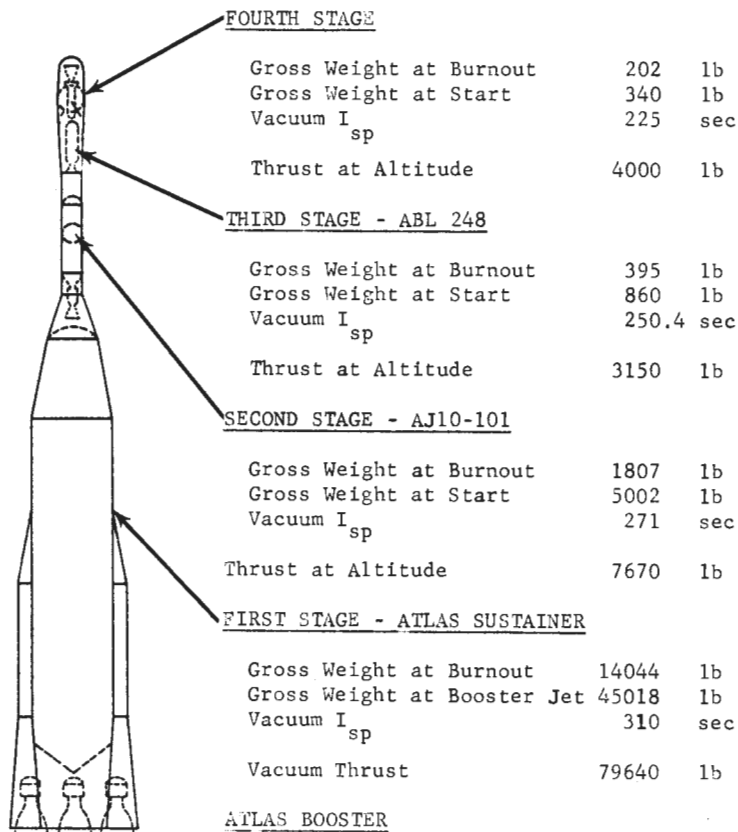
2. Newly manufactured tape punches, reportedly capable of eliminating difficulties in the former punches, are promised for delivery the week of 6 November.

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SPACE PROBES GLOSSARY

ABLE-4 VEHICLES



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V. ABLE-3

A. Experiments

1. The Space Physics Data Library, located in Los Angeles, is now in operation. Already stored within the Library are 600 magnetic tapes from ABLE-3, as well as tapes from Pioneer I and Pioneer II (ABLE-1). The Library is preparing a catalog of ABLE-3 trajectories.

2. Data reduction gear in the Library is in breadboard operation. Installation completion is anticipated by mid-November.

3. The anomalous propagation effects apparent on ABLE-3 require special procedures for the reduction of its magnetic tapes. This is caused by the fact that the sub-carrier is strongly amplitude modulated which results in frequent discriminator thresholding.

4. A detailed post-flight calibration of the ABLE-3 scintillation counter is awaiting completion of a vacuum chamber.

B. Data Acquisition and Analysis

1. Reproduction of Sanborn recordings (wax-covered, heat-sensitive paper on which a heated stylus cuts) of the analog data from ABLE-3 has been progressing in the Space Physics Data Library. Approximately 75 percent of the Sanborn recordings from the Singapore Station have not been reproduced because of high noise levels. The same quantity of Sanborn recordings from the other ground stations have been reproduced.

2. The Data Reduction Center has begun producing magnetic tape dubs for Stanford University of the ABLE-3 VLF Propagation experiment. This experiment was furnished by Stanford University for the ABLE-3 payload. The University sent blank tapes to Space Technology Laboratories, along with instructions as to what information was desired.

3. The Space Physics Data Library, on 17 October, began to rerun magnetometer data from ground station magnetic tape recordings. The data has not been reduced as yet.

4. On 22 October a report was published on a Subcommutator Data Study, (i.e., payload performance data, temperatures and voltages, based primarily on quick look information).

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